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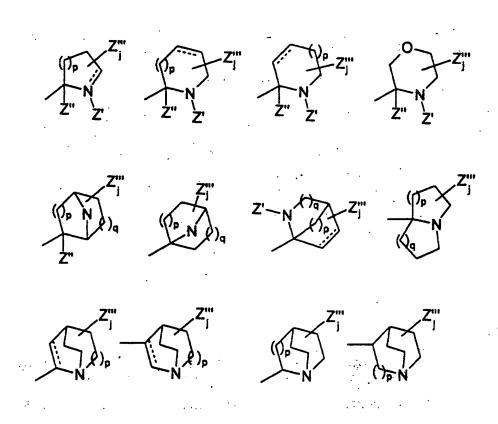
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Examiner: V. Balasubramanian

Group Art Unit: 1624

PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE

-SR', $-N_3$, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', $-O(CR'R'')_rC(=O)R'$, -C(=O)R', -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, $-O(CR'R'')_rC(=O)R''$ $O(CR'R'')_rNR'R'' - O(CR'R'')_rNR''C(=O)R', -O(CR'R'')_rNR''SO_2R', -OC(=O)NR'R'', -NR'C(=O)O$ R", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:



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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond, p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3,

wherein Z"j refers to j number of Z" substituents.

16. (Three Times Amended) A compound of the formula:

$$CX \xrightarrow{A} X C \equiv C - (CEE^I)_m - (CE^IE^{II})_n - Q$$

`2

where X" is nitrogen and X, X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, - $CN_1 - NO_2 - C_2R'_1 - SR'_1 - N_3 - C(=O)NR'R''_1 - NR'C(=O)R''_1 - C(=O)R'_1 - C(=O)OR'_1 - OC(=O)R'_1 -$ OC(=O)NR'R", -NR'C(=O)O R", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, nonaromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and

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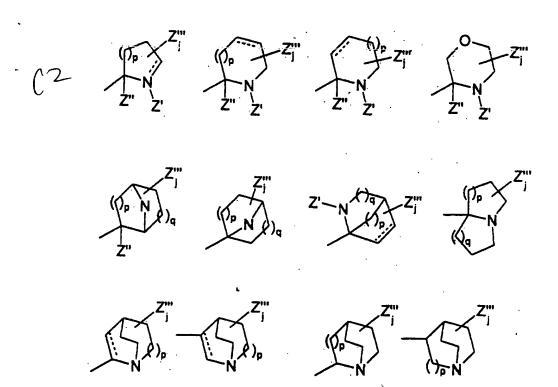
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PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE For:

substituted non-aromatic heterocyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable nonhydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halosubstituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3,

wherein Z'''j refers to j number of Z''' substituents.

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A pharmaceutical composition incorporating a 25. (Three Times Amended) compound of

$$X = CH = CH - (CEE^{I})_m - (CE^{II})_n - Q$$

where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, -NO₂, -C₂R', -SR', $-N_3$, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', $-O(CR'R'')_rC(=O)R'$, -C(=O)R', -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, -C(=O)OR', $-O(CR'R'')_rC(=O)R'$, $-O(CR'R'')_rC(=O)R''$ $O(CR'R'')_rNR'R'' - O(CR'R'')_rNR''C(=O)R', -O(CR'R'')_rNR''SO_2R', -OC(=O)NR'R'', -NR'C(=O)O$ R", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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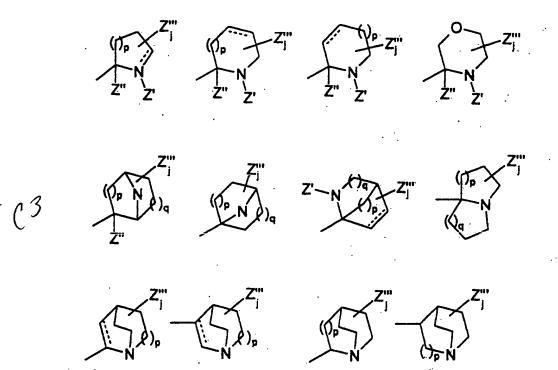
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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3, along with a pharmaceutically acceptable carrier,

wherein Z"j refers to j number of Z" substituents.

41. (Three Times Amended) A pharmaceutical composition incorporating a compound of the formula:

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$$Cx_{A} \times C \equiv C - (CEE^{i})_{m} - (CE^{i}E^{il})_{n} - Q$$

where X" is nitrogen and X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, - $CN_1 - NO_2 - C_2R'_1 - SR'_1 - N_3 - C(=O)NR'R''_1 - NR'C(=O)R''_1 - C(=O)R'_1 - C(=O)OR'_1 - OC(=O)R'_1 -$ OC(=O)NR'R", -NR'C(=O)O R", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halosubstituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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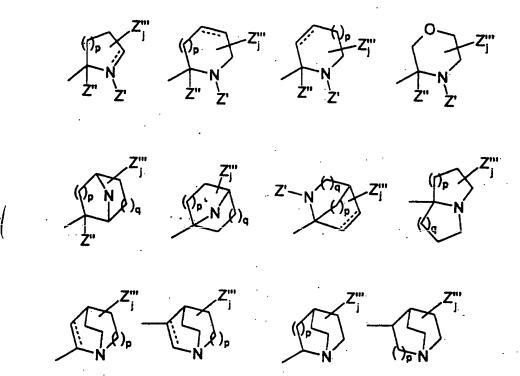
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where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; arid Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3, and a pharmaceutically acceptable carrier,

wherein Z"j refers to j number of Z" substituents.

51. (Three Times Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising administering an effective amount of a compound having the formula:



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$$\begin{array}{c|c} X & \text{CH=CH} & --\left(\begin{array}{c} CEE^I \end{array}\right)_m - \left(\begin{array}{c} CE^{II}E^{III} \right)_n - Q \end{array}$$

where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, -CN, -NO₂, -C₂R', -SR', -N₃, C(=O)NR'R", -NR'C(=O)R", -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R")_rNR'C(=O)R', -O(CR'R")_rNR'R" -O(CR'R")_rNR'C(=O)R', -O(CR'R")_rNR'SO₂R', -OC(=O)NR'R", -NR'C(=O)OR", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

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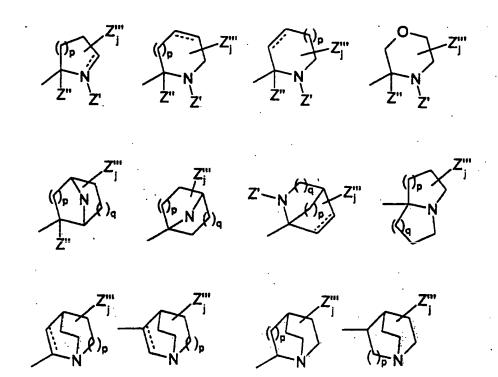
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where Z' is hydrogen, lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3,

wherein Z'"; refers to j number of Z'" substituents, and

wherein the central nervous system disorder is selected from the group consisting of presenile dementia, senile dementia, HIV-dementia, multiple cerebral infarcts, Parkinsonism, Pick's disease. Huntington's chorea, tardive dyskindesia, hyperkinesias, mania, attention deficit disorder, anxiety, depression, mild cognitive impairment, dyslexia, schizophrenia and Tourette's syndrome.

In re application of: DULL ET AL.

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66. (Three Times Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising of the administration of an effective amount of a compound having the formula:

$$C = C - (CEE^{I})_{m} - (CE^{I}E^{II})_{n} - Q$$

$$D_{k} X^{m}$$

C 6

where X" is nitrogen, X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R", -CF₃, - $CN, -NO_2, -C_2R', -SR', -N_3, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -C(=O)R''$ $O(CR'R'')_rC(=O)R', -O(CR'R'')_rNR'R'' -O(CR'R'')_rNR''C(=O)R', -O(CR'R'')_rNR''SO_2R', -O(CR'R'')_rNR''SO_2R'', -O(CR'R'')_rN'', -O(CR'R''')_rN'', -O(CR'R'')_rN'', -O(CR'R''')_rN'', -O(CR'R''')_rN'', -O(CR'R''')_rN''', -O(CR'R''')_r$ OC(=O)NR'R", -NR'C(=O)O R", -SO₂R', -SO₂NR'R", and -NR'SO₂R", where R' and R" are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R" can together form a cycloalkyl group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X"; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, nonaromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E^I, E^{II} and E^{III} individually represent hydrogen or a suitable nonhydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halosubstituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl,

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substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

where Z' is hydrogen, lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z" is hydrogen or lower alkyl; and Z" is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3,

wherein Z"j refers to j number of Z" substituents, and

wherein the central nervous system disorder is selected from the group consisting of presenile dementia, senile dementia, HIV-dementia, multiple cerebral infarcts, Parkinsonism, Pick's disease, Huntington's chorea, tardive dyskindesia, hyperkinesias, mania, attention deficit